Mount Washington, New Hampshire, 64, sw., 1st; 100, nw., 2d; 99, sw., 3d; 88, nw., 4th; 60, w. 5th; 78, nw., 7th; 58, nw., 8th; 88, se., 9th; 92, se., 10th; 101, w., 11th; 86, sw., 13th; 108, se., 16th; 60, nw., 21st; 59, nw., 23d; 50, nw., 27th.

Pike's Peak, Colorado, 50, nw., 9th; 60, nw. 10th; 76, nw., 11th; 54, n., 13th; 55, nw., 15th; 52, nw., 27th.

Cape Mendocino, California, 92, se., 1st; 104, se., 2d; 76, se., 3d; 92, s., 18th; 56, s., 19th.

Sandy Hook, New Jersey, 54, w., 10th; 56, nw., 11th; 56, se. and nw., 16th; 56, w., 17th.

Cape May, New Jersey, 52, nw., 10th; 55, nw., 11th; 52, nw., 17th.

Kitty Hawk, North Carolina, 56, n., 14th; 54, n., 20th.

Buffalo, New York, 56, sw., 10th; 52, sw., 11th.

Fort Maginnis, Montana, 56, w., 2d; 64, w., 16th.

Fort Macon, North Carolina, 58, se., 16th.

Barnegat City, New Jersey, 58, se., 16th.

Boston, Massachusetts, 54, e., 16th.

Block Island, Rhode Island, 52, ne., 15th.

New Haven, Connecticut, 50, e., 16th.

Delaware, Breakwater, Delaware, 52, ne., 15th.

Cheyenne, Wyoming, 56, nw., 4th.

Chincoteague, Virginia, 52, nw., 1st.

Fort Buford, Dakota, 50, w., 3d.

The total movements of the air, with the highest velocities recorded during February at the various Signal Service stations, are shown in the table of miscellaneous meteorological data.

LOCAL STORMS AND TORNADOES.

Cape Mendocino, California, 1st: a high southeasterly wind prevailed during the day, increasing to hurricane force at night; it continued with great violence and reached a maximum velocity of one hundred and four miles during the early morning of the 2d.

Cape Lookout, North Carolina, 4th: during the morning light southerly winds prevailed, increasing in force during the afternoon and blowing at the rate of sixty miles per hour at 4 p. m.

Cheyenne, Wyoming: dangerously high winds from the northwest prevailed on the 4th; a violent gust of seventy miles per hour occurred at 3.30 p. m.; it lasted about one minute, carrying immense clouds of dust into the air.

Denver, Colorado: high westerly winds prevailed from 1.30 to 7.15 p. m. on the 4th; at 5 p. m. a velocity of sixty-four miles was recorded; out-buildings, trees, signs, etc., were blown down. At Georgetown, fifty miles distant, a railway train was blown from the track and several persons were injured. High winds also prevailed at Denver during the night of the 4–5th, and until 1.30 p. m.; a velocity of forty-two miles occurred at 5.20 a. m.

New River Inlet, North Carolina: a thunderstorm from the northwest prevailed from 5.10 to 5.20 p. m. on the 4th, accompanied by high winds and small hail; fencing and trees were blown down.

Fort Macon, North Carolina, 4th; a thunderstorm began at 5.45 p. m. and continued for thirty minutes, the wind reaching a velocity of fifty-two miles from the west.

Norwood, Warren County, Georgia: a tornado moving in a northeasterly direction occurred one mile northwest of this place at 6.30 p. m. on the 9th; numerous out-buildings were destroyed.

A tornado is also reported to have occurred twenty-seven miles northwest of Charlotte, North Carolina, on the 10th.

Kitty Hawk, North Carolina: a high northerly wind, accompanied by a severe snow squall which lasted fifteen minutes, occurred on the 20th; the squall of drifting snow and sand made it impossible to see objects twenty feet distant; a maximum wind velocity of fifty-four miles per hour occurred at 9.05 a. m.

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the following table are shown the danger points in the rivers at the various stations, the highest and lowest stages for February, 1885, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, February, 1885.

[*Expressed in feet and tenths.*]

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, Louisiana	29 9	1	24 1	23	15 6	8 5
Arkansas:						
Fort Smith, Arkansas	15 0	8, 9	8 2	22, 23	‡— 1 4	9 6
Little Rock, Arkansas	23 0	11	15 5	25	6 0	9 5
Missouri:						
Yankton, Dakota*	24 0					
Omaha, Nebraska*	18 0					
Leavenworth, Kansas*	20 0					
Mississippi:						
Saint Paul, Minnesota*	14 5					
La Crosse, Wisconsin*	24 0					
Dubuque, Iowa*	16 0					
Davenport, Iowa*	15 0					
Keokuk, Iowa*	14 0					
Saint Louis, Missouri	32 0	9	15 0	28	7 7	7 3
Cairo, Illinois	40 0	15, 16	27 9	27, 28	16 0	11 9
Memphis, Tennessee	34 0	1	20 9	28	10 7	16 2
Vicksburg, Mississippi	41 0	2, 3, 4	42 4	28	28 6	13 8
New Orleans, Louisiana†	—3 0	3, 8	— 1 5	28	— 3 6	2 1
Ohio:						
Pittsburg, Pennsylvania	22 0	11	8 3	24	1 8	6 5
Cincinnati, Ohio	50 0	12	29 2	25	7 3	21 9
Louisville, Kentucky	25 0	13	11 0	27	5 0	6 0
Cumberland:						
Nashville, Tennessee	40 0	1, 13	16 2	25	7 7	8 5
Tennessee:						
Knoxville, Tennessee						
Chattanooga, Tennessee	33 0	12	9 6	23, 24	5 0	4 6
Monongahela:						
Pittsburg, Pennsylvania	29 0	11	8 3	24	1 8	6 5
Savannah:						
Augusta, Georgia	32 0	11	20 8	24	8 6	12 2
Mobile:						
Mobile, Alabama		1	17 8	27	15 3	2 5
Sacramento:						
Red Bluff, California						
Sacramento, California		10–13	18 0	28	16 1	1 9
Willamette:						
Portland, Oregon		21	12 3	1	5 0	7 3
Colorado:						
Yuma, Arizona						

* Frozen the entire month. † Below high-water mark of 1874 and 1883. ‡ Below bench mark.

ICE IN RIVERS AND HARBORS.

Arkansas river.—Fort Smith, Arkansas; on the 12th, there were large quantities of ice in river.

Barnegat bay.—Barnegat City, New Jersey: bay frozen from 3d to 9th.

Chesapeake bay and Patapsco river.—Baltimore, Maryland: considerable ice in bay and river on 2d and 3d, interrupting navigation; ice formed rapidly on the 11th; on the 22d the harbor was frozen over, and ice is reported to have been three inches thick as far down as Point Lookout.

Chincoteague bay.—Chincoteague, Virginia: bay frozen from 21st to 25th; ice went out of bay on 26th.

Delaware bay.—Delaware Breakwater: on the 23d the harbor was frozen and the bay full of ice; the ice extended seaward as far as could be seen.

Delaware river.—Trenton, New Jersey: an ice-dam formed on the 10th, causing an overflow; in south Trenton scores of houses were flooded nearly to the second stories.

Goose lake.—Lake View, Oregon: the ice in the lake broke up on the 4th.

James river.—Lynchburg, Virginia: the river above the water works was frozen on the 21st, the ice being sufficiently strong to bear skaters; on the 24th, the ice was four inches thick.

Kentucky river.—Hawesville, Hancock county, Kentucky: on the 21st, the river was frozen across, the ice being three inches thick.

Kitty Hawk bay.—Kitty Hawk, North Carolina: ice formed in bay on the 11th; on the 21st navigation was interrupted by ice, and on the 22d the bay was frozen.

Lake Michigan.—Milwaukee, Wisconsin, 28th: navigation between this place and the ports on the opposite side of the lake was suspended during the whole month on account of heavy ice. At the close of the month there were three propellers fast in the ice in mid lake and others lying on the eastern shore were ice-bound, the harbors being blockaded with ice which, in some places, was thirty feet in depth. Between Milwaukee and Grand Haven there were only about ten miles of open water, and the south end of the lake was completely blocked with ice from shore to shore. Old navigators state that it has been many years since there was so much ice in Lake Michigan.

Grand Haven, Michigan: the harbor was blocked with ice from the 5th to the 9th, 11th to 14th, and from the 16th to 28th; on the 9th the high winds broke up the ice near the harbor entrance, and the propellers "Michigan" and "Milwaukee" reached open water, having been ice-bound since January 20th. On the 18th a part of the crew of the propeller "Oneida" arrived at Grand Haven, having abandoned the propeller on account of limited supply of provisions. They reported that the propeller was lying twenty-five miles south of Grand Haven surrounded by immense ice-fields which extended as far as could be seen from the cross-trees. The crew also reported that the ice extended from shore to shore, in places being heaped up to the height of thirty-five feet above the surface of the water.

Lake Ontario.—Hamilton, Ontario: on the 11th the lake was frozen for a distance of ten miles from the shore.

Little Egg harbor.—Little Egg Harbor, New Jersey: navigation was interrupted by ice on the 21st; the ice went out of the harbor on the 27th.

Long Island sound.—Whitestone, Long Island: on the 10th the entrance to the sound was obstructed by large ice-fields.

Mississippi river.—Cairo, Illinois: navigation between this place and Saint Louis was resumed on the 4th; it was again suspended on the 10th.

Memphis, Tennessee: navigation was closed on account of drift ice from the 15th to 26th; on the 28th the ice disappeared from the river.

The Mississippi river was frozen throughout the month from Keokuk, Iowa, northward.

Missouri river.—Fort Benton, Montana: the river opened gradually on the 28th.

The Missouri river was frozen from Yankton, Dakota, to Leavenworth, Kansas, throughout the month.

Narragansett bay.—Narragansett Pier, Rhode Island: large fields of ice passed out of the bay on the 8th, 9th, 13th, 14th, 15th, 24th, 25th.

New Haven harbor.—New Haven, Connecticut: the harbor was entirely frozen on the 11th; on the 17th the western end of Long Island sound was frozen and closed to navigation for the first time since the winter of 1872–'73.

New York harbor.—New York City: on the 2d large masses of ice were running in North river, rendering navigation difficult; also on the 5th, 6th, 7th, 11th, 17th, 18th, 21st, 23d; on the 25th the ice went out of the harbor.

Niagara river.—Buffalo, New York: on the 17th, ice was thirty-three inches thick. River men state that the river froze to a greater distance up the stream than has been known for many years.

Ohio river.—Pittsburg, Pennsylvania: floating ice from 10th to 13th, and from 16th to 24th.

Cincinnati, Ohio: drift ice in river on 1st, 2d, 3d; on the 4th the river was clear of ice and navigation was resumed to all points except Pittsburg; floating ice on 6th, 11th, 12th, 13th, interrupting navigation on the latter date, but navigation was resumed to points southward on the 14th; the heavy drift ice on the 15th caused general suspension of navigation; heavy drift ice continued from the 18th to the 28th; on the 26th the river was frozen half way across.

Louisville, Kentucky: floating ice on 1st, 2d, 4th, 6th, 10th to 28th; navigation was suspended on the 11th, 12th, 13th, and from 18th to 28th.

Cairo, Illinois: floating ice from 11th to 21st.

Oswego river.—Oswego, New York: the ice broke up on the 10th; the river froze again on the 11th.

Pamlico sound.—Portsmouth, North Carolina: on the 20th the ice extended to a distance of two hundred yards from the shore and was two inches in thickness.

Passamaquoddy bay.—Eastport, Maine: floating ice on the 27th and 28th.

Potomac river.—Washington, District of Columbia: along the shores the ice was about four inches thick on the 2d; the steamer "Arrowsmith" experienced much difficulty in making a trip to Alexandria on this date; the ice broke upon the 4th; on the 10th the river was free from ice, but it froze over on the 11th; on the 12th the ice was from four to five inches thick, and on the 23d, ice from seven to eight inches thick was harvested.

Raritan river.—New Brunswick, Middlesex county, New Jersey: the ice began to break up on the morning of the 10th.

Saint Clair river.—Port Huron, Michigan: the ice moved for a distance of several hundred feet on the 23d, leaving about one-fifth of the river open; the ferry-boats made regular trips on the 24th; the ice bridge at Gratiot remained firm on the latter date.

Snake river.—Lewiston, Idaho: ice broke on the 6th; only a slight rise occurred.

Sinepuxeat bay.—Ocean City, Maryland: the bay was nearly closed with ice on the 11th.

Susquehanna river.—Port Deposit, Maryland: an extensive ice-dam formed at this place on the 10th.

Thames river.—New London, Connecticut: large quantities of ice filled the river on the 26th.

Vineyard sound.—Vineyard Haven, Massachusetts: on the 20th no clear water could be seen, and the harbor was full of solid ice; twenty schooners were ice-bound.

West Branch, Susquehana river.—Lock Haven, Clinton county, Pennsylvania: on the 24th there was an ice-dam fifteen miles in length between Glen Union and Queen's Run, the ice being piled to a height of from fifteen to twenty-five feet in some places.

Yellowstone river.—Glendive, Montana: the ice broke on the morning of the 6th, and formed an ice-dam several miles in extent, causing an overflow of the lowlands above this place.

FLOODS.

Newburyport, Massachusetts: the heavy rain during the night of the 9-10th, and the melting of the snow flooded many cellars and caused a large amount of damage.

New Haven, Connecticut: considerable damage was caused by the freshet in the Housatonic and Naugatuck rivers during the night of the 9-10th; many cellars were flooded and a large part of the canal bank was washed away. At Bridgeport two dams were washed away.

Wilmington, Delaware: the Brandywine river rose rapidly during the night of the 9-10th; during the early morning of 10th an unfinished span of the Baltimore and Philadelphia railroad bridge was swept away, entailing a loss of $20.000.

Elkton, Cecil county, Maryland: the heavy rains during the night of the 9–10th caused the Big and Little Elk creeks to overflow, and a large amount of damage resulted.

Chester, Pennsylvania: the heavy rains of the 9th and the melting of the snow on the hillsides caused the water in Chester creek to rise to an unusual height. The Lenne dam broke, which resulted in considerable damage. At Rockdale, a mill was flooded and goods damaged to the extent of $3,000. The trestle work on the Chester creek railway was carried away, causing suspension of traffic.

HIGH TIDES.

New London, Connecticut, 16th.

Delaware Breakwater, Delaware, 16th.

Ocean City, Maryland, 14th, overflowing the beach, but caused no serious damage; high tide also on the 15th.

Narragansett Pier, Rhode Island, 9th, 16th.

Sandy Hook, New Jersey, 16th.
Barnegat City, New Jersey, 16th.
Fort Macon, North Carolina, 16th.
Hatteras, North Carolina, 10th, 14th, 16th.
New River Inlet, North Carolina, 1st, 2d, 9th, 10th, 16th, 17th.
Kitty Hawk, North Carolina, 14th, unusually high.
Philadelphia, Pennsylvania: the tide in the river on the 16th was the highest known since February, 1876, and in many places the water overflowed the wharves.

LOW TIDES.

Eastport, Maine, 2d, 3d, 24th.
Indianola, Texas, 15th.

TEMPERATURE OF WATER.

The following table shows the highest and lowest temperatures of water at the several stations; the monthly ranges of water temperature; the average depth at which the observations were made; and the mean temperature of the air:

At Block Island, Rhode Island, observations were made from 11th to 28th, only; at New Haven, Connecticut, the harbor was frozen from 22d to 28th, during which time no observations were made; at Chincoteague, Virginia, observations were interrupted by ice from 21st to 24th; at Marquette, Michigan, no record was made, the signal office having been burned.

Temperature of water for February, 1885.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
	°	°	°		°
Atlantic City, New Jersey	35.8	29.5	6.0	2 7	25.7
Alpena, Michigan †					
Augusta, Georgia	59.7	36.6	13.1	12 0	42.8
Baltimore, Maryland	35.1	31.9	3.2	9 8	28.5
Block Island, Rhode Island*	34.0	29.0	5.0	7 0	24.2
Boston, Massachusetts	30.0	28.6	1.4	21 9	20.5
Buffalo, New York †					
Canby, Fort, Washington Territory	47.1	42.1	5.0	17 2	45.7
Cedar Keys, Florida	62.3	53.4	8.9	9 6	54.9
Charleston, South Carolina	57.0	45.1	11.9	40 8	47.5
Chicago, Illinois †					
Chincoteague, Virginia *	40.5	30.1	10.4	5 6	31.5
Cleveland, Ohio †					
Detroit, Michigan †					
Delaware Breakwater, Delaware	35.3	19.8	15.7	9 8	28.4
Duluth, Minnesota †					
Eastport, Maine	35.3	32.5	2.8	14 7	18.5
Escanaba, Michigan †					
Galveston, Texas	60.4	45.3	15.1	12 4	52.6
Grand Haven, Michigan †					
Indianola, Texas	61.9	45.1	16.8	9 0	51.7
Jacksonville, Florida	59.0	54.0	5.6	18 0	51.3
Key West, Florida	76.8	64.0	12.8	17 2	68.2
Mackinaw City, Michigan †					
Macon, Fort, North Carolina	52.2	42.0	10.2	6 8	41 5
Marquette, Michigan *					
Milwaukee, Wisconsin †					
Mobile, Alabama	75.4	43.1	32.3	16 5	48.3
New Haven, Connecticut *	31.2	29.7	1.5	16 4	19.7
New London, Connecticut	36.9	32.9	4.0	11 4	22.7
New York City	33.0	30.4	2.6	15 9	23.1
Norfolk, Virginia	44.4	33.8	10.6	17 1	37.2
Pensacola, Florida	58.3	49.5	8.5	10 9	50.7
Portland, Maine	33.3	30.3	3.0	16 8	20.3
Portland, Oregon	46.5	40.6	5.9	59 0	47.1
Sandusky, Ohio †					
Sandy Hook, New Jersey	36.3	31.1	5.2	1 9	25.2
San Francisco, California	54.8	53.1	1.7	36 9	54.4
Savannah, Georgia	51.2	41.1	10.1	10 0	49.6
Smithville, North Carolina	51.0	45.5	5.5	10 6	42.5
Toledo, Ohio †					
Wilmington, North Carolina	49.5	41.0	8.5	14 5	45.1

* Record incomplete—see text. † Frozen the entire month.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for February, 1885, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 82.79 per cent. The percentages for the four elements are: Weather, 85.08; direction of the wind, 77.92; temperature, 82.19; barometer, 88.88 per cent. By geographical districts, they are: For New England, 83.93; middle Atlantic states, 83.89; south Atlantic states, 83.25; eastern Gulf states, 84.18; western Gulf states, 84.77; lower lake region, 83.72; upper lake region, 81.87; Ohio valley and Tennessee, 82.76; upper Mississippi valley, 83.19; Missouri valley, 74.83; north Pacific coast region, 96.00; middle Pacific coast region, 76.92; south Pacific coast region, 97.22. There were twenty omissions to predict out of 3,011, or 0.66 per cent. Of the 2,991 predictions that have been made, eighty-four, or 2.81 per cent., are considered to have entirely failed; one hundred and twenty-nine, or 4.31 per cent., were one-fourth verified; four hundred and twenty-seven, or 14.28 per cent., were one-half verified; four hundred and eighty-two, or 16.11 per cent., were three-fourths verified; 1,869, or 62.49 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During February, 1885, one hundred and sixty cautionary signals were ordered. Of these, one hundred and forty-four, or 93.75 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. Seventy-seven cautionary off-shore signals were ordered, all of which were justified as to direction, and seventy, or 90.90 per cent., were justified as to velocity. Two hundred and thirty-seven signals of all kinds were ordered, two hundred and twenty, or 92.83 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the above cautionary off-shore signals, fifty-four were changed from cautionary signals. Six signals were ordered late. In eighty-four cases winds of twenty-five miles or more per hour were reported for which no signals were ordered.

COLD-WAVE SIGNALS.

During February, 1885, there were one hundred and forty-five cold-wave signals ordered, of which number one hundred and twenty-nine, or 89.0 per cent. were justified.

RAILWAY WEATHER SIGNALS.

The following is from the February, 1885, report of the "Alabama Weather Service," under direction of Professor P. H. Mell, jr.:

The predictions for the month of February telegraphed by General Hazen, the Chief Signal Officer, were as follows:

Local rains.—5th, 8th, 9th, 12th, 13th, 14th, 15th, 18th, 24th, 25th.

Fair weather.—1st, 2d, 3d, 4th, 6th, 7th, 10th, 11th, 16th, 17th, 19th, 20th, 21st, 22d, 23d, 26th, 27th, 28th.

Lower temperature.—1st, 2d, 5th, 6th, 9th, 10th, 13th, 16th, 18th, 20th.

Higher temperature.—3d, 4th, 7th, 8th, 12th, 14th, 15th, 17th, 22d, 23d, 24th, 26th, 27th, 28th.

Stationary temperature.—11th, 19th, 21st, 25th.

Cold wave signals ordered 8th, 9th, 16th.

A careful examination of the meteorological reports from all quarters of the state shows the verification of the weather predictions to be 92 per cent. and of the temperature 94 per cent.

ATMOSPHERIC ELECTRICITY.

AURORAS.

During February, 1885, there occurred two auroral displays which were widely observed in the northern districts; these were observed during the nights of the 5–6th and 11–12th, and were reported by numerous stations from New England westward to Montana. The following reports relating to the displays of February have been received:

Captain Irving, commanding the s. s. "Republic," reports having observed an aurora on the 5th in latitude N. 49°, longitude W. 34°.

Point Judith, Rhode Island, 5th: at 7.05 p. m. an auroral arch covered 70° of the northern horizon; it was about 5° in width and at its highest point about 8° above the horizon; the display continued until the early morning of the 6th. From 12.05 a. m. until daylight of the 12th a pale auroral light of straw color, with occasional beams, was observed.

Alpena, Michigan, 5th: an auroral light was first noticed at 8.40 p. m. consisting of a diffuse light without streamers; it disappeared at 10.30 p. m.

Grand Haven, Michigan, 5th: a faint aurora was visible